# UNUSUAL OCCURRENCE REPORT

## EG&G IDAHO INC.



1. UOR Number EG&G-85-41
   Facility Number ATR-85-8
2. Status and Date: X Initial 7-18-85
   ___ Interim ___
   X Final 11-13-85

* **NOTE**: This occurrence was initally reported as a revision to UOR EG&G-85-17, dated 7-18-85. The decision was then made to report under a separate UOR. This UOR satisfies that decision.

3. Division or Project:

   Test Reactor Area (TRA)
   Test Reactor Programs Division
   Idaho National Engineering Laboratory (INEL)

| 4. Facility, System, or Equipment: | 5. Date of Occurrence: | 6. Time of Occurrence: |
|---|---|---|
| Firewater System | 7-12-85 | 2145 |

7. Subject of Occurrence:

   Spread of Radioactive Contamination, Firewater Line Separation

8. Apparent Cause: Design ___ Material ___ Personnel X Procedure ___
   Other ___ (Explain in Item 14)

9. Description of Occurrence:

During excavation for radioactive waste line repair reported in UOR EG&G-85-17, a corner thrust block on the 10 inch fire line was disturbed by the backhoe operator. The affected section of fire main was isolated to prevent fire line separation/leakage. The TRA Hot Cell, served by this section of the fire main, was provided an alternate source of fire water.

The damaged section of waste line was replaced. The waste line was then leak checked and placed in service. A new thrust block was installed on the fire main. The fire main was leak checked and returned to service at 1045 hours, 7-11-85, but before backfilling and compacting soil behind the thrust block.

At 2145 hours, 7-12-85, the No. 2 Diesel Firewater pump started on low fire main pressure. Upon investigation, it was found that the newly installed thrust block had shifted, allowing the fire main to separate at an elbow joint and water to flow over the surrounding area. The water carried low level contamination from the excavation to the low lying area to the south and east.

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10. Operating Condition of Facility of Time of Occurrence:

The ATR was not a factor in this occurrence. Only routine evolutions were occurring within TRA Hot Cells and the areas adjacent to the involved area.

11. Immediate Evaluation:

Following the fire main separation, low level contamination was spread over a large area in the Southeast corner of the TRA. The probable cause of the fire main separation was movement of the newly installed thrust block allowing separation of the fire water line.

12. Immediate Action Taken and Results:

1. The affected section of fire main was isolated to stop the leak.
2. DOE-ID and EG&G Management personnel were notified.
3. Barriers were established to prevent personnel contamination.
4. Radiation/contamination surveys were conducted to identify and characterize the extent of the contamination problem (Sketch 1).
5. ATR Operations, TRA Safety and TRA I&M Management personnel responded to the occurrence, evaluated the situation, and formulated a recovery plan to define, contain, monitor and reduce the area contamination.

13. Is Further Evaluation Required? Yes ____ No X

If Yes, Before Further Operation? Yes ____ No X

If Yes, By Whom? _____

When? _____

14. Final Evaluation and Lessons Learned:

An evaluation was conducted to determine the probable cause of the thrust block movement. Specifications and requirements regarding construction, location, size, etc., of the thrust blocks are contained in National Fire Protection Association (NFM) Standard 24 entitled "Standard for the Installation of Private Fire Main Service Mains and their Appurtenances". This standard specifies that a thrust block for a 10" diameter elbow should have an area of 13 ft.$^2$. The backing (thrust block) should be placed between undisturbed earth and the fitting to be anchored.

This standard was not known to the engineer, and therefore was not consulted by the engineer issuing the work instructions for the placement of the replacement thrust block. The work instructions requested placement of a new thrust block using concrete at a size equal or larger than that which was removed. This was felt to be adequate in the absence of known standards. The failure to be aware of, and therefore to use the NFPA Standards, is considered to be the primary cause of the fire water line separation.

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14. Final Evaluation and Lessons Learned: (Cont'd)

The work instructions given to the maintenance personnel were basically verbal and as such did not receive formal review by management, safety and/or fire engineering personnel.

The elbow in the 10 inch fire water pipe was connected to a short (approximately four feet) section of fire main. The other end of the section of the fire water line was a mechanical joint which was water tight, but would permit pivoting of the pipe without the placement of an adequate thrust block. The location of the first joint was not known, and if known, would have identified more clearly the need for a larger thrust block.

The elbow was exposed during excavation for a radioactive waste line leak repair as described in UOR EG&G-85-17. The soil removed from the excavation, and that remaining after excavation, was contaminated with low-level radioactivity. The final decision to remove the remainder of the contaminated soil or to leave the contaminated soil in place, had not been made. Therefore, approval to backfill the hole and thrust block with clean soil, which would have contaminated additional soil, was not given. It is believed that thrust block movement would not have occurred, if back filling and compaction of the soil behind the new thrust block with soil had occurred.

15. Corrective Action:

Taken X Recommended _____ To Be Supplied _____

1. Provide an alternate source of firewater to the TRA Hot Cell building until fire main repairs are completed.

   Action: ATR Operations, TRA I&M Date: Completed

2. Set up high volume air samplers at strategic downwind locations in and around the contaminated areas to allow determination of contamination movement. The results of these samples indicated no airborne contamination problems existed.

   Action: TRA Safety Date: Completed

3. Decontaminate affected areas of the TRA reactor services building MTR 635.

   Action: TRA I&M Date: Completed

4. Decontaminate the concrete pad and asphalt south of building MTR 635.

   Action: TRA I&M Date: Completed

5. Evaluate the amount of radioactivity discharged to the soil from the fire main leak.

   Action: TRA Waste Coordinator Date: Completed

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15. Corrective Action: (Cont'd)

RESULTS: Soil samples and radiation surveys were utilized to estimate the amount of radioactivity release to the soil. Approximately 7500 square yards of soil was potentially contaminated. Soil Samples were found to contain primarily Cesium-137, Cesium-134, and Cobalt-60 with maximum concentrations at 5.7E-4 µCi/g and an average concentration of 50E-6 µCi/g. The estimated total radioactive release to the soil totaled 3.0 millicuries. The contamination in general appeared to be located near the surface of the soil (within the top one inch) and affixed to the soil particles.

6. Determine the root cause of the fire main thrust block movement and fire line separation.

Action: ATR Operations, TRTSB, TRA I&M Date: Completed

7. Repair the affected section of fire main.

Action: TRTSB, TRA I&M Date: Completed

8. Take appropriate disciplinary action based on the findings of item 6.

Action: TRTSB Date: Completed

9. Characterize the extent of migration of the liquid waste in the soil due to the waste line leak and the fire main leak.

Action: TRA Waste Coordinator Date: Completed

RESULT: Prior to the fire line separation, measurements had not yet been taken to determine the extent of downward migration of radioactive contamination. The effect of the firewater line separation on the existing radioactive contamination location could not be determined. However, the excavation was approximately 7 feet deep and the activity was still present. Following the fire main separation the depth of the soil contamination was determined by driving a hollow pointed pipe into the ground at the bottom of the excavation and measuring the radiation levels inside the pipe. This investigation revealed that there existed a definite line of demarcation between contaminated and non-contaminated soil. The measurement revealed that this line of demarcation was located approximately ten (10) feet below grade. It is felt that this measurement adjacent to the leak location would represent the maximum depth that contamination would be found throughout the area.

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15. Corrective Action: (Cont'd)

10. Evaluate, based upon the data available, the long term options as to:

1. Remove the radioactive material, or
2. Stabilize in place for future Decontamination and Decomissioning of the soil affected by the leaking waste line.

Action: TRA Waste Coordinator Date: Completed

RESULTS: Based upon the widespread nature of the radioactive contamination, the decision was made to remove the contaminated soil to prevent further the spread of radioactive contamination.

16. Programmatic Impact:

None.

17. Impact Codes and Standards:

None.

18. Similar Unusual Occurrence Report Numbers:

EG&G-84-1

19. Signatures:

Originated by: D. E. Sheldon Date 11-13-85
D. E. Sheldon, TRA Waste Coordinator, PRP

Reviewed by: R. D. Boyer Date 11-13-85
R. D. Boyer, Manager, Safety

Reviewed by: G. J. Alletzhauser Date 11-13-85
G. J. Alletzhauser, Lead Quality Engineer, Quality

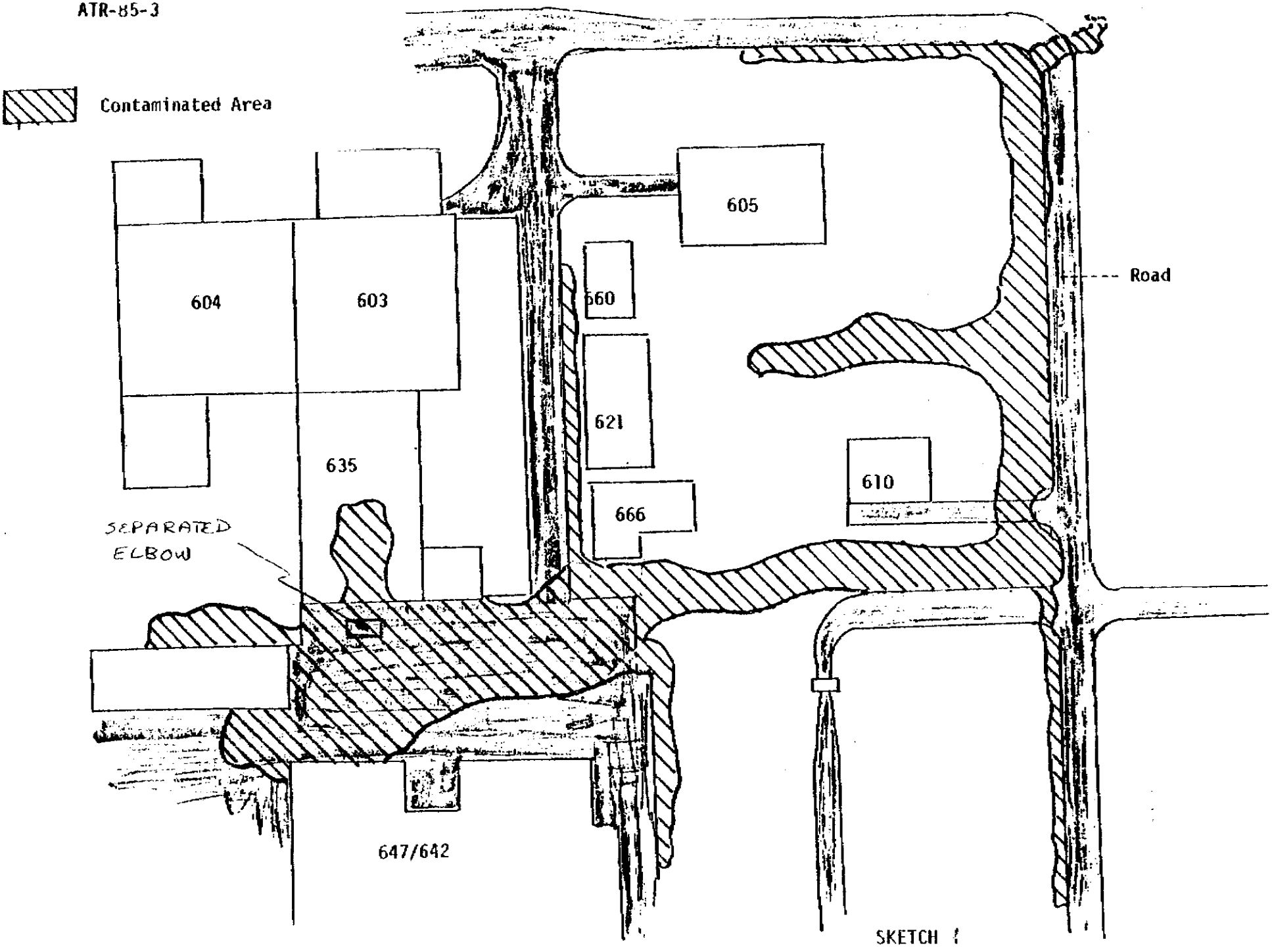
Reviewed by: D. R. Mousseau Date 11-13-85
* D. R. Mousseau, Manager, Technical Support

Reviewed by: W. Amidei Date 11/13/85
* W. Amidei, Jr., Manager, TRA Maintenance Operations

Approved by: J. A. Hong Date 11-13-85
J. A. Hong, Manager, ATR Operations

*An EG&G Idaho Inc. reorganization resulted in organizational name changes on the signature list from those responsibilities identified in the body of the UOR.

ATR-85-3




SKETCH 1